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TRENDS OF GRASSHOPPER POPULATIONS IN THE AREAS OF  
MAJOR OUTBREAKS 1940 AND 1941R. L. Shotwell, entomologist, and  
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In the general and special grasshopper surveys conducted by the Bureau of Entomology and Plant Quarantine, in cooperation with various State entomological agencies, collections have been made late in the summer or fall of adult grasshoppers in the representative crops or habitats for each State or section thereof. The specimens in these collections were identified and the relative numbers of the species in each environment recorded. From 1934 to 1939, inclusive, the collecting was general throughout the States involved. A series of six supplements to the Insect Pest Survey Bulletin contain the data for these years, as follows: 1934, vol. 14, No. 9; 1935, vol. 16, No. 5; 1936, vol. 17, No. 3; 1937, vol. 18, No. 6; 1938, vol. 19, No. 4; and 1939, vol. 21, No. 5.

In 1940 and 1941 the collections were made only in three to six permanently located representative areas about 20 miles square in each of nine Rocky Mountain and Central Great Plains States in which grasshoppers are a major problem. Because of this change in procedure, the data for these 2 years were not treated in the same manner as those for the previous 6 years. Together with records of estimated population, they are being utilized in a study of trends in the abundance of the different species found in the representative areas.

Usually an outbreak in any given area at any one time consists mostly of one, or perhaps two, species, and altogether less than a dozen species have been of any importance in outbreaks. It is therefore believed that the trends of only these few species need be considered in evaluating the grasshopper situation. The average numbers of grasshoppers and grasshopper egg pods per unit area, as found in the general survey data, include all the species, regardless of their economic importance, and conclusions from such data should be qualified to fit the trends of the dominant species. By adopting this procedure any over- or under-evaluation of conditions based solely on an annual fall egg survey in known infested areas can be qualified or corrected.

The following 10 species were included in the tables because of their common occurrence and economic importance:

<u>Aeoloplus turnbullii</u> (Thos.)	<u>Melanoplus differentialis</u> (Thos.)
<u>Agrototettix deorum</u> (Scudd.)	<u>Melanoplus femur-rubrum</u> (Deg.)
<u>Aulocara ellioti</u> (Thos.)	<u>Melanoplus foedus</u> (Scudd.)
<u>Cammula pellucida</u> (Scudd.)	<u>Melanoplus mexicanus</u> (Sauss.)
<u>Melanoplus bivittatus</u> (Say)	<u>Melanoplus packardii</u> (Scudd.)

The data were obtained from the collections and adult survey records made during the last 6 years in seven States having major grasshopper infestations. These data were considered sufficient to show trends in six major crops and habitats selected as important in most of these States.

Where zeros are recorded in the tables no specimen of that species was collected in that habitat during that year, although it probably was present, but was either so scarce or so agile as to escape the collector's net. None of the collections made in Colorado or Kansas have ever shown the true relative abundance of Dissosteira longipennis, because it is too agile to be captured by ordinary collecting and for that reason it has not been included in the tables. It is largely a range species, however, and this report deals mainly with so-called crop grasshoppers.

Where figures were available, the average total populations of all species are given for all environments because they show the general trends for all species collectively. Where advisable, a State was divided on the basis of wide differences in rainfall.

The conclusions drawn from the tables for seven States are based on the surveys of the permanent representative areas made in 1940 and 1941. These areas were selected because of their past grasshopper history, and most of them are located in the areas of heaviest infestation. Therefore, the averages for 1940 and 1941 are probably exaggerated and not representative of conditions in any State as a whole.

Generally speaking, grasshopper infestations throughout the seven States are at present at a relatively low stage, especially those composed of the most important species, and particularly of Melanoplus mexicanus. The surveys of 1941 indicate that M. bivittatus, M. differentialis, and M. femur-rubrum have supplanted M. mexicanus in importance in many of the areas showing economic infestations.

#### COLORADO

Only the foothill and plains area east of the mountains was included in the study of Colorado. This is an area of diversified farming, either irrigated or nonirrigated, where the principal crops are winter wheat and other small grains, corn, sorghums, alfalfa, tame and wild hay, sugar beets, and truck crops. There is also included an abundance of pasture land used for the raising of beef cattle and sheep.

In the irrigated sections Melanoplus bivittatus, M. differentialis, M. femur-rubrum, and M. mexicanus are the important species, with Aeoloplus turnbullii sometimes numerous. In the dryland crops, M. mexicanus is the major species, with A. turnbullii, M. packardii, and M. foedus of greater



importance here than in the irrigated sections. On the range land Dissosteira longipennis has been the most destructive species.

In general, during the last 6 years, the greatest numbers of the predominant species occurred during the period from 1936 to 1939, inclusive. A sharp decrease in numbers in all habitats occurred in 1940 and a sharp rise, especially of Melanoplus mexicanus, in 1941. This rise was due largely to the development of a second generation of this species, to flights out of western Kansas during the summer of that year, and to the fact that the records are based on limited areas of heavier than average infestation. Aeoloplus turnbullii reached a peak of abundance in grasslands and idle land in 1938 and has declined since. A great reduction occurred in June 1941, following heavy rains. On June 28 from 1 to 5, fourth- and fifth-instar specimens per each Russian-thistle were found dead and clinging to the plants in the manner typical of grasshoppers attacked by fungus. The highest record was 12 per square yard dead, but other species were not noticeably affected at this time.

#### KANSAS

For the purpose of these studies the State of Kansas was divided at the 98th meridian into eastern and western parts, with corn the major crop in the east and winter wheat in the west. Alfalfa is of greater importance in the east than in the west, where pasture and idle lands make up the greater part of the farmed areas. Because of the infrequency of surveys in the eastern section of the State, the data in the tables are limited to those gathered in the more frequent and uniform surveys made in the western section.

Although no adults were collected in the western part in 1936, this was a year of severe damage to corn in the eastern part, where Melanoplus differentialis was the most important species. From 1937 to 1939, inclusive, there was a marked increase in numbers of M. mexicanus in the western part of the State. In 1940 there was a sharp decrease of all species and as marked an increase in 1941. This increase was confined largely to the western third of the State, as the eastern half has had relatively low populations since 1936. The western third of Kansas is an area marked by a second generation of M. mexicanus, which, in 1941, hatched about August 1.

In 1938 and 1939, Aeoloplus turnbullii reached its greatest abundance, but dropped to low numbers in 1940 and 1941. This species is limited largely to the western third of the State.

#### MONTANA

In Montana the major crops are hard spring wheat and other small grains. Idle land and range land make up most of the rest of the agricultural areas. Weedy stubble fields and idle land are the chief source of grasshopper infestation. Corn, sorghum, and alfalfa fields are not major sources of infestation. In all past outbreaks Melanoplus mexicanus has been by far the dominant species, forming from 75 percent of the population on the range, although its chief habitats have been small-grain stubble and idle land. In irrigated sections M. bivittatus has at times been

important, and in mountain valleys the same is true of Camnula pellucida. Field margins are not such important sources of infestation in Montana as they are in other States, where M. bivittatus, M. differentialis, or C. pellucida often occur in outbreak numbers. Therefore the true current index to grasshopper conditions in Montana is probably the relative numbers of M. mexicanus found in small grain, idle land, or range land.

The table for Montana shows decidedly smaller numbers of all species in all habitats in 1937, as compared with 1936. Unprecedented flights of Melanoplus mexicanus from the Dakotas in July 1938 doubled or tripled the average M. mexicanus population in crops and increased it sixfold on the range land. Although the infestations shifted by flights in 1939 from eastern to north-central Montana, the averages for M. mexicanus for the State remained about the same.

The data indicate that in 1940 decidedly smaller numbers of all species occurred in all environments, and that in 1941 slightly larger numbers occurred in the small-grain crop, with greater increases in idle land and range land. The exceptional rise in numbers in idle land in 1941 may be due to the fact that idle land was surveyed on only two of the five Montana areas. The infestations in these two areas were comparatively heavy; hence they are not truly representative of the infestation in the idle lands of the State as a whole.

The surveys for the 6 years do not reflect consistently the numbers of grasshoppers in the minor habitats from year to year. Four of the areas surveyed in 1940 and known to be lightly infested in 1941 were not included in the 1941 survey. A revision of the project made it necessary to omit them and retain only those having the heaviest infestations and the most important grasshopper history. Thus there probably was not the general increase in population in 1941 that the figures in the table indicate.

#### NEBRASKA

Because of differences in crop, soil, and climatic conditions, Nebraska was divided into eastern and western parts, making the division along the western boundaries of Boyd, Holt, Garfield, Valley, Sherman, Buffalo, Phelps, and Harlan Counties.

The eastern part includes about two-fifths of the State and has more intensive farming and a greater amount of rainfall and native vegetation than the western part. Corn is the major crop, with small grains second, and with alfalfa relatively more important than in the western part of the State. Pastures are small. Melanoplus differentialis is probably the principal economic species here, being the most important one in corn, sorghum, and alfalfa areas. M. mexicanus and M. bivittatus are of secondary importance.

In the western three-fifths of the State the sand-hill section comprises over half the area, with much open range land and waste land throughout. Melanoplus bivittatus replaces M. differentialis in part, and M. mexicanus is the dominant species.



With corn, sorghums, winter wheat, and rye comprising 59 percent of the total land cropped in Nebraska as a whole, margins of fields, together with alfalfa and small pastures, become a chief source of infestation. In western Nebraska the trend of population for Melanoplus mexicanus, M. bivittatus, and M. differentialis has been downward in practically all important environments since 1939, whereas in the eastern part the reverse has been true. The decided increase of M. mexicanus in small grain, legumes, field margins, and pastures agrees with known increases in the same habitats in western Iowa, which adjoins. Aeoloplus turnbullii became a dominant species along the field margins in western Nebraska in 1940 and 1941 and in eastern Nebraska in 1940 and was still important there in 1941. The total populations for all species may be exaggerated in the 1941 surveys, as only 4 areas were surveyed -- Albion and Kearney, in the eastern part, and Chadron and Bridgeport in the western. The data are very limited. In the eastern part a greater normal rainfall tends to inhibit grasshopper increase; hence infestations in that area may not develop their potentialities unless the growing season is abnormally dry.

#### NORTH DAKOTA

As to grasshopper habitats, the western two-thirds of North Dakota is much like eastern Montana. Melanoplus mexicanus is the most important species, but M. bivittatus here becomes of greater importance than in Montana, and at times M. differentialis becomes the dominant species in the area extending from Dickinson to Mandan. In the northern part Camula pellucida has also been of local importance.

In the eastern third of North Dakota the soil is blacker and richer and there is more rainfall and more intensified farming than in the western part. More corn and legumes are raised and native vegetation is more lush, with tall grasses and weeds along the field margins. There is less of pasture and other grassland. Here Melanoplus bivittatus, M. mexicanus, and Camula pellucida have at various times occurred in outbreak numbers. Much of this area is designated as the Red River Valley. The division between eastern and western North Dakota was made at the western boundaries of Cavalier, Ramsey, Eddy, Foster, Stutsman, La Moure, and Dickey Counties. This places all of the central part of the State in the western division, leaving only a third of the State in the eastern division. This was done in order that the latter section would be limited largely to the Red River Valley and the 20-inch rain belt.

Most of the severe grasshopper outbreaks have been limited to the western two-thirds of the State, and there are no records of collections made in the eastern third for the years 1936 and 1937, although a limited general survey was made there.

As a result of the unprecedented flights of Melanoplus mexicanus into North Dakota from South Dakota in 1938, the adult populations in western North Dakota were increasingly higher in 1938 and 1939 than in 1936 and 1937. From 1938 to 1939 there was a big decrease in numbers of M. mexicanus in corn, sorghums, and grassland, which are among the habitats least attractive to this species, although the more favored habitats,

small grain and legumes, showed small increases. In very heavy infestations there is a spread into less favorable places, and at such times, the population estimates do not indicate material differences in abundance between these and more favorable environments.

In 1940 and 1941 in western North Dakota there was a marked decrease in numbers of Melanoplus mexicanus in all habitats, as compared with those present in 1938 and 1939. At the same time there has also been a general increase of M. bivittatus and M. differentialis in the major habitats in that area. These species were more abundant in 1941 than in any of the previous 5 years. Generally speaking this is not true in eastern North Dakota, where there has been a general decrease in numbers of M. bivittatus, M. mexicanus, and M. differentialis in all habitats. On the other hand, a high total population has been maintained by a decided increase in M. femur-rubrum in grassland, legumes, and field margins. The general population for small grain was low in 1941. Neither M. bivittatus nor M. differentialis compares with M. mexicanus in importance in North Dakota, and M. femur-rubrum even less than these first two. In 1941 M. mexicanus was at the lowest level of the 6 years in all habitats.

#### SOUTH DAKOTA

Although a division should be made between eastern and western South Dakota, the western half is mostly range land, and most of the survey data came from the eastern half of the State. Small grains, corn, and sorghums are the major crops, and idle land and grasslands form a large part of the land area.

Melanoplus bivittatus and M. differentialis are prominent species in South Dakota and field margins are one of their favorite habitats. For this reason fence rows, coulee banks, headlands, roadsides, and roadside ditchbanks, in addition to stubblefields and idle lands, are important sources of infestation. M. mexicanus is not the predominant species in this State, as it is in western North Dakota or Montana, but shares importance with M. bivittatus and M. differentialis. Small grain stubble together with idle land and poor stands of alfalfa, is the chief source of infestation by this species. Consideration must be given to all three of these species and their habitats. M. femur-rubrum is numerous, especially in eastern South Dakota, but is less destructive and infestations by it should be discounted accordingly. Its chief habitat is alfalfa. Fairly heavy concentrations of M. bivittatus and M. differentialis may be confined mainly to native vegetation, and one can easily be misled into believing infestations by these two species are more serious than they really are.

From 1936 to 1939, inclusive, Melanoplus mexicanus was the dominant species in practically all environments, reaching extraordinary outbreak numbers in 1937 and causing unprecedented flights the next year. During 1940 and 1941 there has been a decided decline in abundance of this species until it now ranks third in numbers. During the same period M. bivittatus and M. differentialis have increased until they rank first and second, respectively.



WYOMING

In the agricultural areas of Wyoming, alfalfa and wild hay are the major crops, with small grains next, followed by corn and sorghums. Melanoplus mexicanus probably has been the most important species and in certain localities at various times M. bivittatus, M. femur-rubrum, and Camnula pellucida were numerous.

For all species 1936 to 1939, inclusive, were the years of greatest infestation. In 1940 there was a sharp decrease to a very low population. There was a marked increase of Melanoplus femur-rubrum in 1941, but M. mexicanus, M. bivittatus, and Camnula pellucida remained at a low level in all habitats. M. femur-rubrum is not so destructive as the other three species.

# Numbers of Grasshoppers per 1,000 square yards in the major habitats of some of the important species

Species	Small grain					Corn and sorghums						
	1936	1937	1938	1939	1940	1941	1936	1937	1938	1939	1940	1941
<i>Aeoloplus turnbullii</i> .....	725	322	312	88	91	156	728	231	377	6	28	0
<i>Ageneotettix deorum</i> .....	89	25	96	16	7	0	85	17	8	0	4	0
<i>Aulocara elioti</i> .....	8	51	323	27	23	0	217	11	64	0	2	0
<i>Carmula pellucida</i> .....	276	0	0	0	1	0	0	2	0	0	0	0
<i>Melanoplus bivittatus</i> .....	935	373	821	76	74	127	407	519	739	239	20	15
<i>Melanoplus differentialis</i> ..	0	170	694	68	27	234	407	218	1,019	325	8	44
<i>Melanoplus femur-rubrum</i> ....	350	823	370	53	10	10	218	90	144	82	3	0
<i>Melanoplus foedus</i> .....	0	254	355	104	21	49	0	637	514	4	5	7
<i>Melanoplus mexicanus</i> .....	1,237	746	1,596	886	150	1,988	1,089	742	1,352	115	17	458
<i>Melanoplus packardii</i> .....	553	170	351	111	10	30	824	160	136	25	3	7
Total, all species 1/ .....	7,902	4,072	6,649	1,667	488	2,690	5,809	3,455	5,735	846	109	562
Legumes												
<i>A. turnbullii</i> .....	479	109	115	27	161	279	2/	2/	1,434	103	693	145
<i>A. deorum</i> .....	305	21	15	13	15	64			73	8	0	0
<i>A. elioti</i> .....	109	21	44	17	18	70			235	8	29	0
<i>C. pellucida</i> .....	0	21	0	0	6	0			0	0	0	0
<i>M. bivittatus</i> .....	1,034	2,369	1,260	468	304	509			765	111	111	145
<i>M. differentialis</i> .....	392	781	1,446	451	179	558			582	123	82	73
<i>M. femur-rubrum</i> .....	4,961	1,862	2,054	1,173	162	424			1,038	29	6	73
<i>M. foedus</i> .....	0	226	207	87	11	21			589	523	274	0
<i>M. mexicanus</i> .....	1,871	724	1,313	1,063	354	563			1,821	1,133	408	1,455
<i>M. packardii</i> .....	43	98	130	103	13	5			288	305	101	291
Total, all species 2/ .....	10,880	9,511	10,020	3,833	1,562	3,217	3,105		9,172	3,048	2,381	7,200
Grasslands												
<i>A. turnbullii</i> .....	256	118	1,151	80	445	314	812	671	620	154	2/	2,204
<i>A. deorum</i> .....	52	84	149	179	123	25	149	42	169	85		69
<i>A. elioti</i> .....	173	148	303	61	252	280	167	65	0	7		154
<i>C. pellucida</i> .....	256	0	0	2	0	0	203	0	0	0		0
<i>M. bivittatus</i> .....	919	64	272	38	61	4	1,098	572	903	939		423
<i>M. differentialis</i> .....	249	18	277	65	21	17	400	276	790	761		261
<i>M. femur-rubrum</i> .....	311	42	422	153	5	131	1,689	499	2,285	1,817		801
<i>M. foedus</i> .....	0	182	781	79	83	114	0	1,306	226	211		121
<i>M. mexicanus</i> .....	754	167	1,989	437	426	297	1,695	968	536	738		1,048
<i>M. packardii</i> .....	138	100	313	106	111	8	578	393	705	107		50
Total, all species 1/ .....	5,710	2,797	11,400	2,060	2,217	2,120	7,013	7,013	6,308	3,520		7,888

1/ Includes other species than those listed above.

2/ No records for that year.



Numbers of grasshoppers per 1,000 square yards in the major habitats of some of the important species

Species	Small grain					Corn and sorghums				
	1936	1937	1938	1939	1940	1941	1936	1937	1938	1939
<i>Aeoloplus turnbullii</i> .....	1/	47	578	1,202	375	23	1/	0	257	6
<i>Ageneotettix deorum</i> .....		22	21	0	0	0		64	2	6
<i>Anlocara eliotti</i> .....		49	82	14	41	30		0	10	0
<i>Cammula pellucida</i> .....		0	0	0	0	0		0	0	0
<i>Melanoplus bivittatus</i> .....		17	402	141	8	53		177	503	430
<i>Melanoplus differentialis</i> ..		75	297	160	6	84		370	696	1,311
<i>Melanoplus femur-rubrum</i> .....		4	9	4	0	0		16	0	0
<i>Melanoplus foedus</i> .....		2	63	53	0	15		0	5	33
<i>Melanoplus mexicanus</i> .....		496	1,512	1,395	326	3,447		1,206	654	265
<i>Melanoplus packardii</i> .....		60	309	306	8	99		48	108	79
Total, all species .....		2,285	4,138	3,800	807	3,821		2,122	2,619	2,417
Species	Legumes					Idle land				
	1936	1937	1938	1939	1940	1941	1936	1937	1938	1939
<i>A. turnbullii</i> .....	1/	8	121	433	192	0	1/	1/	2,370	1,043
<i>A. deorum</i> .....		19	6	0	0	0			0	0
<i>A. eliotti</i> .....		4	6	0	87	0			0	0
<i>C. pellucida</i> .....		0	0	0	0	0			0	0
<i>M. bivittatus</i> .....		164	681	100	524	9,867			163	208
<i>M. differentialis</i> .....		431	1,088	633	315	8,458			436	339
<i>M. femur-rubrum</i> .....		67	24	33	0	0			27	0
<i>M. foedus</i> .....		28	6	100	0	1,174			0	326
<i>M. mexicanus</i> .....		617	1,671	1,733	1,206	2,595			545	2,700
<i>M. packardii</i> .....		84	139	400	17	0			218	587
Total, all species .....		3,739	5,450	5,000	2,500	24,667			4,849	7,500
Species	Grassland					Margins				
	1936	1937	1938	1939	1940	1941	1936	1937	1938	1939
<i>A. turnbullii</i> .....	1/	19	159	994	2	44	1/	185	1,425	1,784
<i>A. deorum</i> .....		68	34	24	0	0		18	25	0
<i>A. eliotti</i> .....		93	172	6	7	953		14	50	12
<i>C. pellucida</i> .....		0	0	0	0	0		0	0	0
<i>M. bivittatus</i> .....		12	146	266	1	199		91	1,400	471
<i>M. differentialis</i> .....		9	130	207	0	111		64	1,374	1,264
<i>M. femur-rubrum</i> .....		3	1	0	0	0		29	102	49
<i>M. foedus</i> .....		1	32	35	0	0		7	25	74
<i>M. mexicanus</i> .....		109	918	521	11	3,727		680	509	1,723
<i>M. packardii</i> .....		4	199	425	0	222		77	611	657
Total, all species .....		1,614	2,653	3,250	29	6,500		4,040	7,662	9,308

1/ No records for that year.

Montana

Numbers of grasshoppers per 1,000 square yards in the major habitats of some of the important species

Species	Small grain					Corn and sorghums						
	1936	1937	1938	1939	1940	1941	1936	1937	1938	1939	1940	1941
<i>Aeoloplus turnbullii</i> .....	16	7	114	45	16	0	1/	0	21	1/	0	1/
<i>Ageneotettix deorum</i> .....	148	61	15	26	14	8		0	0		0	
<i>Aulocara eliotti</i> .....	951	165	49	15	9	4		0	0		0	
<i>Camula pellucida</i> .....	635	64	47	15	14	1		40	21		0	
<i>Melanoplus bivittatus</i> .....	541	89	63	78	52	137		188	64		0	
<i>Melanoplus differentialis</i> .....	0	0	0	11	0	0		0	0		0	
<i>Melanoplus femur-rubrum</i> .....	734	73	54	104	65	61		0	0		0	
<i>Melanoplus foedus</i> .....	0	0	0	0	0	0		0	0		0	
<i>Melanoplus mexicanus</i> .....	5,153	1,255	3,523	4,074	2,222	2,798		1,382	5,844		188	
<i>Melanoplus packardii</i> .....	573	114	152	384	139	81		268	85		0	
Total, all species .....	9,340	2,630	4,290	5,540	2,630	3,130	8,330	2,240	6,230		250	
Legumes												
<i>A. turnbullii</i> .....	23	33	19	29	37	0	0	74	130	94	155	61
<i>A. deorum</i> .....	168	71	17	19	0	0	285	82	46	147	288	267
<i>A. eliotti</i> .....	261	104	52	10	0	0	464	72	167	127	42	133
<i>C. pellucida</i> .....	1,289	193	211	104	103	8	65	5	46	54	0	0
<i>M. bivittatus</i> .....	568	97	693	236	505	170	50	13	122	46	89	729
<i>M. differentialis</i> .....	0	7	52	0	0	0	0	0	3	0	0	12
<i>M. femur-rubrum</i> .....	2,900	651	992	1,322	794	266	240	22	124	441	135	85
<i>M. foedus</i> .....	0	4	0	0	0	0	0	0	9	0	0	0
<i>M. mexicanus</i> .....	5,778	971	3,015	5,305	4,269	1,314	4,000	2,119	5,280	6,612	5,644	7,066
<i>M. packardii</i> .....	429	171	396	406	112	4	810	138	225	881	232	898
Total, all species .....	11,860	4,160	6,630	8,930	6,000	2,000	6,720	3,070	6,640	10,550	5,270	10,640
Grassland												
<i>A. turnbullii</i> .....	189	18	24	23	4	51	191	65	129	193	5	121
<i>A. deorum</i> .....	990	350	209	1,154	218	461	344	333	277	328	44	24
<i>A. eliotti</i> .....	1,424	426	210	381	17	118	1,693	560	240	61	38	6
<i>C. pellucida</i> .....	436	128	112	68	29	8	998	521	148	185	60	55
<i>M. bivittatus</i> .....	124	31	47	19	13	15	407	215	702	378	272	55
<i>M. differentialis</i> .....	0	8	0	0	0	0	0	0	0	168	5	0
<i>M. femur-rubrum</i> .....	82	62	105	205	42	4	912	96	462	589	398	200
<i>M. foedus</i> .....	0	0	0	0	0	0	0	0	148	0	0	0
<i>M. mexicanus</i> .....	1,122	330	1,843	1,390	418	1,199	3,323	1,133	5,586	9,111	4,513	5,005
<i>M. packardii</i> .....	195	36	185	140	44	34	719	223	610	1,127	213	374
Total, all species .....	6,090	2,840	3,710	7,160	2,250	3,200	9,900	6,060	8,970	16,970	6,050	6,650

1/

No records for that year.

1/ No records for that year.



Numbers of grasshoppers per 1,000 square yards in the major habitats of some of the important species

Species	Small grain (Eastern)					Small grain (Western)						
	1936	1937	1938	1939	1940	1941	1936	1937	1938	1939	1940	1941
<i>Aeoloplus turnbullii</i> .....	1/	146	12	0	743	277	1/	70	143	637	602	76
<i>Ageneotettix deorum</i> .....		251	88	258	78	65		63	132	146	67	0
<i>Anlocara ellioti</i> .....		21	48	0	99	228		25	438	158	55	42
<i>Cannula pellucida</i> .....		0	0	0	0	0		0	0	0	0	0
<i>Melanoplus bivittatus</i> .....		460	202	151	170	374		19	276	729	115	135
<i>Melanoplus differentialis</i> ..		356	231	1,145	368	537		6	269	300	107	8
<i>Melanoplus femur-rubrum</i> .....		84	41	806	0	33		6	48	111	20	0
<i>Melanoplus foedus</i> .....		0	0	0	0	16		32	100	275	111	151
<i>Melanoplus mexicanus</i> .....		753	1,480	4,587	983	4,362		714	1,303	2,090	662	606
<i>Melanoplus packardii</i> .....		84	31	0	23	163		44	85	169	12	17
Total, all species .....		3,160	2,650	7,600	2,610	6,250		2,730	3,660	5,560	2,310	1,220
Corn and sorghum (Eastern)												
<i>A. turnbullii</i> .....	1/	0	0	0	64	1/	1/	1/	90	46	74	1/
<i>A. deorum</i> .....		0	40	28	0	0			0	100	0	0
<i>A. ellioti</i> .....		0	2	0	0	0			28	56	0	0
<i>C. pellucida</i> .....		0	0	0	0	0			0	0	0	0
<i>M. bivittatus</i> .....		46	240	735	212				531	1,360	294	
<i>M. differentialis</i> .....		1,165	478	3,578	552				179	1,336	405	
<i>M. femur-rubrum</i> .....		0	18	382	6				62	153	0	
<i>M. foedus</i> .....		0	5	0	0				48	54	88	
<i>M. mexicanus</i> .....		69	492	664	116				366	426	162	
<i>M. packardii</i> .....		0	28	14	0				117	36	37	
Total, all species .....		1,370	1,390	5,500	970	630		390	2,070	3,800	1,310	
Legumes (Eastern)												
<i>A. turnbullii</i> .....	1/	0	73	0	394	762	1/	152	555	195	418	288
<i>A. deorum</i> .....		82	106	378	76	44		61	366	82	68	10
<i>A. ellioti</i> .....		0	47	0	15	218		8	151	47	57	0
<i>C. pellucida</i> .....		0	0	0	0	0		0	0	2	11	0
<i>M. bivittatus</i> .....		195	913	603	1,707	1,193		414	1,446	1,648	982	706
<i>M. differentialis</i> .....		527	1,298	3,575	1,851	544		245	831	1,108	641	40
<i>M. femur-rubrum</i> .....		212	166	981	83	370		245	1,090	827	181	139
<i>M. foedus</i> .....		7	0	0	0	0		217	98	209	45	20
<i>M. mexicanus</i> .....		1,048	2,301	2,064	781	8,279		376	2,841	2,135	1,028	99
<i>M. packardii</i> .....		57	97	21	99	762		86	241	214	113	0
Total, all species .....		4,910	6,150	11,570	5,940	12,900		3,990	12,250	8,080	3,670	3,300

1/ No records for that year.

Nebraska (Eastern and Western) - (Continued)

Species	Idle land (Eastern)					Idle land (Western)						
	1936	1937	1938	1939	1940	1941	1936	1937	1938	1939	1940	1941
<i>Aeoloplus turnbullii</i> .....	1/	0	0	1/	2,552	1/	1/	0	0	242	1,058	1/
<i>Ageneotettix deorum</i> .....		388	377		132			435	72	56	47	
<i>Aulocara ellioti</i> .....		0	0		88			0	0	56	57	
<i>Cannula pellucida</i> .....		0	0		0			0	0	0	0	
<i>Melanoplus bivittatus</i> .....			785		535			348	288	433	114	
<i>Melanoplus differentialis</i> ..		194	938		572			0	611	317	124	
<i>Melanoplus femur-rubrum</i> ..		291	252		81			261	468	134	181	
<i>Melanoplus foedus</i> .....		97	0		0			0	328	891	243	
<i>Melanoplus mexicanus</i> .....		1,212	2,021		1,525			1,306	1,799	2,669	842	
<i>Melanoplus packardii</i> .....		97	155		124			87	576	466	98	
Total, all species .....		4,800	6,450		7,070			3,570	9,180	9,110	4,160	
	Grassland (Eastern)						Grassland (Western)					
<i>A. turnbullii</i> .....	1/	1,075	4	1/	1/	147	1/	66	74	128	616	168
<i>A. deorum</i> .....		397	688			242		205	1,312	1,033	555	52
<i>A. ellioti</i> .....		233	45			484		280	536	274	185	412
<i>C. pellucida</i> .....		0	0			0		0	0	0	0	0
<i>M. bivittatus</i> .....		538	50			0		16	172	36	31	41
<i>M. differentialis</i> .....		421	41			32		2	5	10	41	0
<i>M. femur-rubrum</i> .....		304	199			600		33	89	476	10	0
<i>M. foedus</i> .....		70	0			116		79	398	80	339	110
<i>M. mexicanus</i> .....		701	1,195			1,189		130	1,912	775	781	360
<i>M. packardii</i> .....		187	90			21		26	177	32	31	0
Total, all species .....		4,300	3,400			5,850		3,070	7,730	4,750	5,690	2,940
	Margins (Eastern)						Margins (Western)					
<i>A. turnbullii</i> .....	1/	0	22	0	2,199	1,545	1/	313	1,043	1,433	1,729	1,173
<i>A. deorum</i> .....		16	22	330	236	195		183	158	234	132	27
<i>A. ellioti</i> .....		0	0	0	32	164		39	118	54	23	71
<i>C. pellucida</i> .....		0	0	0	0	0		0	0	0	0	0
<i>M. bivittatus</i> .....		343	2,136	728	1,207	1,575		414	807	1,721	464	693
<i>M. differentialis</i> .....		487	3,396	4,725	1,304	2,133		96	1,063	1,056	249	9
<i>M. femur-rubrum</i> .....		40	180	2,239	280	230		404	276	1,116	336	249
<i>M. foedus</i> .....		0	0	0	10	65		472	1,063	344	136	347
<i>M. mexicanus</i> .....		1,029	1,754	1,552	776	4,691		828	4,705	2,031	816	729
<i>M. packardii</i> .....		0	90	0	54	328		202	492	147	94	18
Total, all species .....		6,860	9,220	11,660	7,470	11,090		5,970	13,205	9,730	5,130	6,570

1/ No records for that year.



North Dakota (Eastern and Western)

Numbers of grasshoppers per 1,000 square yards in the major habitats for some of the important species

Species	Small grain (Eastern)					Small grain (Western)						
	1936	1937	1938	1939	1940	1941	1936	1937	1938	1939	1940	1941
<i>Aeoloplus turnbullii</i> .....	1/	1/	0	4	0	0	43	8	0	42	46	21
<i>Ageneotettix deorum</i> .....			30	459	686	0	493	123	91	349	235	109
<i>Anlocara ellioti</i> .....			5	36	79	0	140	32	91	94	86	32
<i>Cannula pellucida</i> .....			226	177	739	82	82	310	183	266	75	3
<i>Melanoplus bivittatus</i> .....			281	682	1,188	489	45	88	253	449	333	481
<i>Melanoplus differentialis</i> ..			0	127	106	0	19	1	112	384	539	926
<i>Melanoplus femur-rubrum</i> .....			276	785	475	468	132	286	42	178	115	56
<i>Melanoplus foedus</i> .....			0	0	0	0	0	0	0	0	0	0
<i>Melanoplus mexicanus</i> .....			7,800	5,325	2,614	876	3,754	5,224	5,622	6,416	1,750	1,450
<i>Melanoplus packardii</i> .....			1,044	626	634	122	389	301	337	337	534	274
Total, all species .....	2,900	4,560	12,550	8,860	8,000	2,240	5,550	6,790	8,590	9,000	4,010	3,770
	Corn and sorghum (Eastern)					Corn and sorghum (Western)						
<i>A. turnbullii</i> .....	1/	1/	0	0	1/	0	0	59	26	0	0	0
<i>A. deorum</i> .....			75	61		0	122	154	13	68	64	0
<i>A. ellioti</i> .....			0	0		0	61	15	13	55	0	0
<i>C. pellucida</i> .....			150	38		0	245	74	53	136	128	0
<i>M. bivittatus</i> .....			426	1,064		756	1,782	193	544	782	766	1,262
<i>M. differentialis</i> .....			0	176		89	61	0	0	276	191	2,459
<i>M. femur-rubrum</i> .....			25	640		22	676	312	26	145	319	0
<i>M. foedus</i> .....			0	0		0	0	0	0	0	0	0
<i>M. mexicanus</i> .....			2,769	1,290		89	3,319	5,005	5,216	1,717	957	642
<i>M. packardii</i> .....			401	413		0	491	386	558	373	255	85
Total, all species .....	2,000	3,220	5,690	4,090		1,000	7,500	6,580	7,260	4,230	3,000	4,940
	Legumes (Eastern)					Legumes (Western)						
<i>A. turnbullii</i> .....	1/	1/	0	0	0	0	0	0	0	131	1/	0
<i>A. deorum</i> .....			205	1,096	54	23	118	295	236	156		19
<i>A. ellioti</i> .....			0	0	0	0	14	0	0	53		19
<i>C. pellucida</i> .....			543	126	54	0	178	0	141	104		19
<i>M. bivittatus</i> .....			364	937	1,679	262	52	626	518	3,150		2,013
<i>M. differentialis</i> .....			0	115	54	57	7	0	0	131		2,364
<i>M. femur-rubrum</i> .....			180	1,672	650	2,187	184	737	94	885		517
<i>M. foedus</i> .....			0	0	0	0	0	0	0	0		0
<i>M. mexicanus</i> .....			9,256	1,672	1,463	114	2,046	6,633	7,585	7,812		2,830
<i>M. packardii</i> .....			753	280	1,950	0	170	479	1,507	1,848		1,182
Total, all species .....	6,080	6,100	15,890	6,330	6,500	3,030	3,000	9,250	11,730	15,000	6,000	10,380
1/ No records for that year.												

North Dakota (Eastern and Western) - Continued

Species	Idle land (Eastern)					Idle land (Western)				
	1936	1937	1938	1939	1940	1941	1936	1937	1938	1939
<i>Ageloplus turnbullii</i> .....	1/	1/	0	0	0	1/	0	100	187	82
<i>Ageneotettix deorum</i> .....	0	0	952	1,872	1,772	0	695	122	83	35
<i>Anlocara elliotti</i> .....	0	0	62	185	0	0	102	27	51	138
<i>Camula pellucida</i> .....	0	0	311	56	222	0	3	14	42	0
<i>Melanoplus bivittatus</i> .....	0	0	133	1,261	590	0	33	122	582	69
<i>Melanoplus differentialis</i> .....	0	0	0	0	148	0	0	0	0	415
<i>Melanoplus femur-rubrum</i> .....	0	0	356	2,447	443	0	59	306	11	138
<i>Melanoplus foedus</i> .....	0	0	0	0	0	0	0	0	0	242
<i>Melanoplus mexicanus</i> .....	0	0	6,871	6,191	3,248	0	2,577	4,523	6,677	0
<i>Melanoplus packardii</i> .....	0	0	444	2,002	1,034	0	330	345	737	2,698
Total, all species .....	5,250	5,430	15,810	15,170	8,120	0	4,360	6,030	10,500	4,670
Grassland (Eastern)										
<i>A. turnbullii</i> .....	1/	1/	0	0	0	0	0	12	0	14
<i>A. deorum</i> .....	0	0	864	1,960	592	204	1,871	1,357	1,321	1,074
<i>A. elliotti</i> .....	0	0	137	66	17	0	174	522	421	1,064
<i>C. pellucida</i> .....	0	0	1,757	171	662	279	10	312	258	18
<i>M. bivittatus</i> .....	0	0	141	52	470	263	5	14	17	342
<i>M. differentialis</i> .....	0	0	0	0	0	0	0	0	0	54
<i>M. femur-rubrum</i> .....	0	0	107	109	400	1,913	15	55	11	45
<i>M. foedus</i> .....	0	0	0	0	0	0	0	0	0	27
<i>M. mexicanus</i> .....	0	0	4,114	1,432	2,506	251	648	1,423	2,652	0
<i>M. packardii</i> .....	0	0	214	80	226	28	154	104	113	577
Total, all species .....	1,000	3,550	12,920	8,060	7,570	4,170	4,000	6,520	8,040	5,670
Grassland (Western)										
<i>A. turnbullii</i> .....	1/	1/	0	0	0	0	105	9	234	325
<i>A. deorum</i> .....	0	0	453	0	67	131	1,087	479	635	771
<i>A. elliotti</i> .....	0	0	0	0	0	0	242	120	386	191
<i>C. pellucida</i> .....	0	0	2,266	270	270	48	123	276	490	162
<i>M. bivittatus</i> .....	0	0	227	1,215	1,215	1,336	850	498	745	81
<i>M. differentialis</i> .....	0	0	453	337	472	138	27	65	0	1,542
<i>M. femur-rubrum</i> .....	0	0	0	472	0	2,107	799	442	55	365
<i>M. foedus</i> .....	0	0	0	0	0	0	0	0	0	243
<i>M. mexicanus</i> .....	0	0	8,559	1,957	1,957	406	5,980	8,247	7,763	0
<i>M. packardii</i> .....	0	0	282	810	810	96	758	884	821	3,125
Total, all species .....	5,250	8,400	22,220	5,670	5,670	5,910	11,420	12,660	14,840	2,163
Margins (Eastern)										
<i>A. turnbullii</i> .....	1/	1/	0	0	0	0	105	9	234	325
<i>A. deorum</i> .....	0	0	453	0	67	131	1,087	479	635	771
<i>A. elliotti</i> .....	0	0	0	0	0	0	242	120	386	191
<i>C. pellucida</i> .....	0	0	2,266	270	270	48	123	276	490	162
<i>M. bivittatus</i> .....	0	0	227	1,215	1,215	1,336	850	498	745	81
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<i>M. femur-rubrum</i> .....	0	0	0	472	0	2,107	799	442	55	365
<i>M. foedus</i> .....	0	0	0	0	0	0	0	0	0	243
<i>M. mexicanus</i> .....	0	0	8,559	1,957	1,957	406	5,980	8,247	7,763	0
<i>M. packardii</i> .....	0	0	282	810	810	96	758	884	821	3,125
Total, all species .....	5,250	8,400	22,220	5,670	5,670	5,910	11,420	12,660	14,840	2,163
Margins (Western)										
<i>A. turnbullii</i> .....	1/	1/	0	0	0	0	105	9	234	325
<i>A. deorum</i> .....	0	0	453	0	67	131	1,087	479	635	771
<i>A. elliotti</i> .....	0	0	0	0	0	0	242	120	386	191
<i>C. pellucida</i> .....	0	0	2,266	270	270	48	123	276	490	162
<i>M. bivittatus</i> .....	0	0	227	1,215	1,215	1,336	850	498	745	81
<i>M. differentialis</i> .....	0	0	453	337	472	138	27	65	0	1,542
<i>M. femur-rubrum</i> .....	0	0	0	472	0	2,107	799	442	55	365
<i>M. foedus</i> .....	0	0	0	0	0	0	0	0	0	243
<i>M. mexicanus</i> .....	0	0	8,559	1,957	1,957	406	5,980	8,247	7,763	0
<i>M. packardii</i> .....	0	0	282	810	810	96	758	884	821	3,125
Total, all species .....	5,250	8,400	22,220	5,670	5,670	5,910	11,420	12,660	14,840	2,163

1/ No records for that year.



Number of grasshoppers per 1,000 square yards in the major habitats of some of the important species

Species	Small grain					Corn and sorghums					Idle land				
	1936	1937	1938	1939	1940	1941	1936	1937	1938	1939	1940	1941	1936	1937	1938
<i>Aeoloplus turnbullii</i> .....	47	95	43	223	112	672	26	40	34	15	16	0	15	40	34
<i>Ageneotettix deorum</i> .....	268	128	127	478	192	393	644	40	13	94	16	30	94	40	16
<i>Anlocara ellioti</i> .....	95	104	313	540	200	369	64	40	42	144	33	91	144	40	33
<i>Camula pellucida</i> .....	12	5	57	4	3	0	116	0	38	0	0	0	0	0	0
<i>Melanoplus bivittatus</i> .....	67	195	341	273	256	1,909	310	201	1,478	918	436	2,277	201	201	918
<i>Melanoplus differentialis</i> .....	47	149	71	762	235	1,094	1,778	148	778	2,019	539	1,752	148	148	778
<i>Melanoplus femur-rubrum</i> .....	1,009	81	90	384	86	185	335	13	46	154	0	61	13	13	46
<i>Melanoplus foedus</i> .....	67	1	2	0	0	0	91	0	0	0	0	0	0	0	0
<i>Melanoplus mexicanus</i> .....	3,632	2,517	3,049	3,518	1,264	1,113	2,293	1,637	1,277	952	383	761	1,637	1,637	952
<i>Melanoplus packardii</i> .....	323	170	250	468	73	189	181	215	235	412	30	61	215	215	412
Total, all species	6,190	3,790	4,980	7,570	2,640	6,350	6,410	2,670	4,730	5,440	1,620	5,550	6,410	2,670	4,730
Legumes															
<i>A. turnbullii</i> .....	0	45	0	159	0	0	1	432	243	158	229	1,903	1	432	243
<i>A. deorum</i> .....	1,009	571	207	411	172	89	2,041	2,041	143	334	123	507	2,041	2,041	143
<i>A. ellioti</i> .....	102	32	132	16	55	0	1,571	1,571	171	167	89	444	1,571	1,571	171
<i>C. pellucida</i> .....	26	12	25	0	0	0	196	196	3	0	20	0	196	196	3
<i>M. bivittatus</i> .....	306	636	911	965	78	0	314	314	641	197	202	2,496	314	314	641
<i>M. differentialis</i> .....	384	506	276	1,345	415	133	78	78	17	541	163	688	78	78	17
<i>M. femur-rubrum</i> .....	3,322	2,064	622	2,231	845	232	2,081	2,081	157	167	126	1,396	2,081	2,081	157
<i>M. foedus</i> .....	0	26	0	0	0	0	0	0	0	9	0	0	0	0	9
<i>M. mexicanus</i> .....	6,299	5,451	2,972	3,972	837	244	6,989	6,989	5,033	6,271	1,316	1,576	6,989	6,989	5,033
<i>M. packardii</i> .....	88	143	126	538	39	7	432	432	598	1,014	155	275	432	432	598
Total, all species	12,790	10,450	8,010	11,530	2,810	830	16,610	16,610	8,310	9,500	2,820	12,620	16,610	16,610	8,310
Grassland															
<i>A. turnbullii</i> .....	26	170	39	39	61	124	0	74	81	571	204	898	74	74	81
<i>A. deorum</i> .....	535	1,435	867	2,507	526	2,260	411	254	320	1,131	376	1,281	254	254	320
<i>A. ellioti</i> .....	159	1,253	778	451	347	621	207	120	610	372	326	1,028	120	120	610
<i>C. pellucida</i> .....	26	34	38	28	29	28	0	17	18	0	9	0	17	17	18
<i>M. bivittatus</i> .....	80	204	60	229	69	184	0	440	1,577	945	467	2,089	440	440	1,577
<i>M. differentialis</i> .....	196	61	14	187	53	76	0	103	197	1,636	409	1,765	103	103	197
<i>M. femur-rubrum</i> .....	133	269	19	115	79	504	0	749	378	487	189	1,521	749	749	378
<i>M. foedus</i> .....	105	60	18	27	0	24	0	5	23	0	3	0	5	5	23
<i>M. mexicanus</i> .....	1,435	2,534	650	974	418	264	12,298	2,816	3,660	3,802	1,167	1,230	2,816	2,816	3,660
<i>M. packardii</i> .....	54	170	56	113	25	19	2,050	697	791	993	153	303	697	697	791
Total, all species	3,540	9,330	4,320	7,410	2,520	9,760	19,690	6,900	10,560	11,680	4,130	13,170	6,900	6,900	10,560

1/ No records for that year.

# Wyoming

Numbers of grasshoppers per 1,000 square yards in the major habitats of some of the important species

Species	Small grain						Legumes					
	1936	1937	1938	1939	1940	1941	1936	1937	1938	1939	1940	1941
<i>Leioloprus turnbullii</i> .....	51	234	11	0	0	3	315	58	15	33	0	0
<i>Ageneotettix deorum</i> .....	311	164	27	144	0	0	110	45	23	134	0	0
<i>Aulocara elliotti</i> .....	296	360	60	48	1	3	218	80	53	169	0	0
<i>Carmula pellucida</i> .....	559	632	130	0	0	3	175	367	151	201	0	5
<i>Melanoplus bivittatus</i> .....	731	591	163	1,054	13	99	1,152	967	472	1,379	30	166
<i>Melanoplus differentialis</i> ..	12	217	2	144	0	0	118	139	14	33	0	0
<i>Melanoplus femur-rubrum</i> ..	298	877	298	2,155	125	459	1,717	1,485	1,172	7,770	417	1,987
<i>Melanoplus foedus</i> .....	0	154	29	239	0	14	0	93	11	33	0	0
<i>Melanoplus mexicanus</i> .....	2,417	3,446	1,282	5,125	125	288	1,435	1,428	1,500	4,944	171	107
<i>Melanoplus packardii</i> .....	404	353	33	48	3	114	620	252	137	235	9	30
Total, all species	5,956	8,261	2,485	9,720	288	1,014	6,243	6,143	5,042	17,232	673	2,670
Idle land												
<i>A. turnbullii</i> .....	209	412	54	198	1	163	128	32	77	7	0	1
<i>A. deorum</i> .....	570	377	81	74	0	0	1,724	470	227	296	0	9
<i>A. elliotti</i> .....	2,664	474	40	0	0	0	1,112	684	221	247	12	4
<i>C. pellucida</i> .....	236	69	17	0	0	0	362	468	46	53	0	0
<i>M. bivittatus</i> .....	40	240	44	345	0	0	299	344	67	10	2	0
<i>M. differentialis</i> .....	20	34	3	0	0	0	12	11	2	0	0	0
<i>M. femur-rubrum</i> .....	29	62	151	0	14	14	530	409	153	33	0	0
<i>M. foedus</i> .....	0	405	165	965	14	14	0	18	25	25	0	1
<i>M. mexicanus</i> .....	3,402	3,013	1,839	2,326	41	41	2,264	898	603	493	32	7
<i>M. packardii</i> .....	550	425	397	569	0	0	304	145	56	23	7	2
Total, all species	8,625	6,428	3,500	6,286	167	286	9,544	5,157	2,067	2,446	111	85
Grassland												
<i>A. turnbullii</i> .....	340	908	164	1	1	122						
<i>A. deorum</i> .....	783	152	115	1	1	11						
<i>A. elliotti</i> .....	671	281	123	7	7	7						
<i>C. pellucida</i> .....	774	1,055	63	79	79	79						
<i>M. bivittatus</i> .....	2,172	385	612	581	581	581						
<i>M. differentialis</i> .....	95	14	66	0	0	0						
<i>M. femur-rubrum</i> .....	1,321	627	1,301	3,041	3,041	3,041						
<i>M. foedus</i> .....	0	124	619	4	4	4						
<i>M. mexicanus</i> .....	3,267	1,292	3,199	610	610	610						
<i>M. packardii</i> .....	1,605	157	273	417	417	417						
Total, all species	14,394	6,061	8,398	24,333	6,061	5,335						
Margin												
<i>A. turnbullii</i> .....	340	908	164	1	1	122						
<i>A. deorum</i> .....	783	152	115	1	1	11						
<i>A. elliotti</i> .....	671	281	123	7	7	7						
<i>C. pellucida</i> .....	774	1,055	63	79	79	79						
<i>M. bivittatus</i> .....	2,172	385	612	581	581	581						
<i>M. differentialis</i> .....	95	14	66	0	0	0						
<i>M. femur-rubrum</i> .....	1,321	627	1,301	3,041	3,041	3,041						
<i>M. foedus</i> .....	0	124	619	4	4	4						
<i>M. mexicanus</i> .....	3,267	1,292	3,199	610	610	610						
<i>M. packardii</i> .....	1,605	157	273	417	417	417						
Total, all species	14,394	6,061	8,398	24,333	6,061	5,335						

1/ No records for that year.





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